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ETHNOMEDICINAL, PHYTOCHEMISTRY AND ETHNO PHARMACOLOGICAL ASPECTS OF THREE MEDICINAL PLANTS OF MALVACEAE USED IN INDIAN TRADITIONAL MEDICINES: A REVIEW

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ABSTRACT

India has today become the diabetic capital of the world with over 20 million diabetes and this number is likely to increase to 57 million by 2025. Diabetes is caused by metabolic disorder of the body systems as a result of chronic hyperglycaemia. Diabetes mellitus is a systemic metabolic disease characterized by hyperglycemia, hyperlipedemia, hyperaminoacidemia, and hypoinsulinaemia it leads to decrease in insulin, secretion and insulin action. Currently available therapies for diabetes include insulin and various oral antidiabetic agents such as sulfonylureas, biguanides, α-glucosidase inhibitors and glinides. In developing countries products are expensive and not easily accessible. The World Health Organization (WHO) has listed 21,000 plants, which are used for medicinal purposes around the world. A list of medicinal plants with proven antidiabetic and related beneficial effects and of herbal drugs used in treatment of diabetes is compiled. *Hibiscus rosa-sinensis, Gossypium herbaceum, Abutilon indicum* are ethnomedicinal plants of Malvaceae family commonly used Indian traditional system of medicines. Traditionally these plants were used in the form of extract/powder/paste by tribal populations of India for treating common ailments like cough and cold, fever, kidney, liver disorders, pains, inflammations, wounds etc. The present review is an overview of phytochemistry and ethnopharmacological studies that support many of traditional ethnomedicinal uses of these plants. Many phytoconstituents have been isolated from the three ethnomedicinal plants and

some of them have shown pharmacological activities that have been demonstrated by in vivo/invitro experiments. Ethnomedicinal uses, supported by scientific evidences are essential for ensuring safe and effective utilization of herbal medicines.

Keywords: ***Hibiscus rosa sinensis; Gossypum herbaceum; Abutilon indicum;*** **ethnopharmacological; Malvaceae; phytoconstituents**

INTRODUCTION

Plants are one of the most important sources of medicines. The medicinal plants are extensively utilized throughout the world in traditional system of medicines "Ayurveda". Medicinal plant is the most exclusive source of life saving drugs for majority of the world‟s population. They continue to be an important therapeutic aid for alleviating the ailments of human kinds. The search for defence mechanism, longevity and remedies to relieve pain and discomfort drove early man to explore these immediate natural surroundings **[1-6]**.

India is rich source of medicinal plants and is called "Botanical Garden of the World" with enormous wealth of biodiversity. There are almost 45,000 plant species recorded in India so far of which 7,500 species have been used for medicinal purposes **[7-8]**.

Malvaceae (Mallow Family) is the family of flowering plants containing about 243 genera and 4225 species. The plants of this family are herbs, shrubs and trees. It is widely distributed throughout the world and particularly in tropical regions, mainly in South America. Around 22 genera of the family are reported from India, many of which have ethnomedicinal value e.g., *Abutilon indicum, Gossypiumherbaceum, Hibiscus mutabilis, Hibiscus sabdariffa, Hibiscus rosa-sinensis, Sidaacuta, Sidacordifolia, Sidarhombifolia* and several others. Keeping this in view the ethnomedicinal, phytochemical and ethnopharmacological aspects of three Malvaceae members (*Abutilon indicum, Hibiscus rosasinesis, Gossypium Herbaceum*), used as crude herbal drugs by ethnic tribes in India and as ingredients of Ayurvedic medicines, have been reviewed. Further, justification of traditional ethnomedicinal uses of these plants by scientific investigations including their phytochemistry and ethnopharmacological activities has been assessed. The choice of these three ethnomedicinal plants is based on the following criteria: (i) all belong to family Malvaceae; (ii) all are used in Ayurveda and Siddha system of Medicines; (iii) all are commonly used by ethnic tribes in most parts

of India; and (iv) extracts of these plants are used to treat similar ailments (e.g., kidney disorders, arthritis, pains, diabetes etc.) **[9-10]**.

MATERIAL AND METHODS

The present study in based on the 3 species belonging to the Malvaceae family were collected and identified. The data was collected from online journals, research papers and books, all of which were published in different countries. Search engine websites such as Google, Google Scholar, Pub Med, Science Direct, Research gate and other online collections were utilized in this review to obtain information **[11-25]**.

RESULTS AND DISCUSSION

Abutilon indicum

Abutilon is a large genus of family Malvaceae, containing 150 species. The plants of this genus are annual or perennial herbs, shrubs and small trees, native to tropical and subtropical regions. The leaves are alternate, unlobed or palmately lobed and the flowers are mostly pink, orange or yellow with five petals. Abutilon is the ancient Greek name for the mulberry tree and to be given to this genus due to resemblance in the shape of the leaves. The genus has a significant importance, which is attributed to valuable insoluble fibers obtained from different species of the genus such as *Abutilon theophrasti* and also due to several species grown as garden ornamental plants such as A. ochsenii and A. vitifolium. The collected data were obtained from the following databases: PubMed, Science Direct, ChemWeb and Google Scholar. This review potentiates the researchers for carrying out further studies on this genus to isolate and develop new drugs from natural sources with wide margin of safety and understanding their effects and possible mechanism of actions. Reviewing the available literature on genus Abutilon revealed the presence of a diversity of secondary metabolites such as flavonoids, phenolic acids, sterols, triterpenes, quinones, coumarins, alkaloids, sphingolipids, megastigmanes, iridoids and others, which are responsible for its biological activities such as anti-inflammatory, analgesic, antipyretic, hepatoprotective, antioxidant, anti-hyperglycemic, gastroprotective, cyto-toxic, antifungal, antibacterial, antiviral, anthelmintic, anti-malarial, anti-leishmanial,

CNS activity, anti-stress, immunostimulant, anti-venom, anti-hyperlipidemic, anti-hypertensive, aphrodisiac, abortifacient, antidiarrhoeal, diuretic, anti-urolithiatic, and wound healing activities.

Taxonomic description

An erect woody under shrub. Leaves ovate, cordate irregularly toothed, covered on both surfaces with white down. Flowers solitary, axillary; calyx 5-lobed, tubular below, lobes ovate-acute; corolla yellow, petals 5, connate below and adnate to the tube of the stamens. Ripe carpels 15-20, longer than the calyx, truncate or shortly waned. Local name: Petari. Habit: Under shrub. Habitat: In waste places

Ethnomedicinal Uses

Diuretic, demulcent; fevers, chest infections, gonorrhea and urethritis; leaves cooked and eaten in bleeding piles, astringent, diuretic, febrifuge, anthelminticas lessens perspiration; good in strangury and urinary complaints. Tonic, aphrodisiac, laxative, emollient and demulcent; good for bronchitis, cough, piles, gonorrhea, and chronic cystitis. Infusion is useful in fever, leprosy, strangury, piles, leucoderma, haematuria and stones in bladder.

Chemical constituents

Chemical constituents of the whole plant of *Abutilon indicum has* resulted in the isolation of two new compounds, abutilon A (1) and(R)-N-(1′-methoxycarbonyl-2′-phenylethyl)-4hydroxy benzamide (2), as well as 28 known compounds like carbohydrates, steroids, glycosides, flavonoids, tannins and Phenolic compounds.

Pharmacological activities

Anti-inflammatory and analgesic activities, Anti-arthritic activity, Antipyretic activity, Antioxidant activity, Hepatoprotective activity, Antihyperglycemic activity, Anti-diarrhoeal activity, Respiratory activity, Gastroprotective and antiulcer activity, Respiratory activity, Anticonvulsant activity, Diuretic activity, Anti-urolithiatic activity, Cytotoxic activity, Antifungal activity, Antibacterial activity, Antiviral activity, Anthelmintic activity, Anti-leishmanial activity, CNS activity, Anti-stress activity, Anti-malarial activity, Larvicidal activity, Immunostimulant effects, Anti-hypertensive Activity, Wound healing activity, Anti-hyperlipidemic activity, Aphrodisiac activity, Abortifacient effects.

Gossypium herbaceum

Taxonomic description: A small, woody, annual shrub. Leaves almost reniform,

distinct cordate-auriculate, 3-5-7 lobed. Inflorescence proliferous, forming many lateral spurs that carry two or more flowers. Bracteoles 3, equalling the capsule, ovate-rotund, top incised into long irregular teeth. Flowers large, yellow with purple claws. Capsules ovoid, acuminate. English name: Cotton. Local name: Karpus Habit: Shrub. Habitat: Cultivated

Ethnomedicinal Uses

Flower used as an abortifacient and to induce menstrual flow.Seeds are demulcent, laxative, expectorant and aphrodisiac. Roots are emmenagogue and galactagogue; useful in dysmenorrhoea and suppression of menstruation. Root bark stimulates uterine contractions and hastens difficult labour. It promotes abortion or onset of menstruation and reduces menstrual flow.

Chemical constituents

The cotton seeds contain glycosides, steroids, resins, saponins, carbohydrates, proteins and phenolic compounds tannins gossyfulvin, gossycaerulin, carotenoids and flavones, yellow pigment. The unsaponifiable fraction of Indian cottonseed oil contains sitosterol and ergostoerol. Other substances present in cotton seeds are saponins, lactic acid choline, betaine and sulphydryl compounds.

Pharmacological acitivites

Anticancer, Antifertility, Antioxidant, Antitrypanosomal, antimalarial, antimicrobial, Anticonvulsant activity, Antiulcer, Diuretic, Wound healing, Hepatoprotective, Galactogauge.

Hibiscus rosa-sinensis

Taxonomic description

An ornamental shrub or small tree.Leaves ovate-lanceolate, more or less acuminate, irregularly and coarsely serrate towards the top.Flowers large, axillary solitary; corolla 7.5 cm diam., tubular below, red. Local name: Jaba, English Name: Shoe flower, China rose. Habit: Shrub. Habitat: Gardens

Ethnomedicinal Uses

Flower buds are cooling and astringent; remove burning of the body, urinary discharges, seminal weakness and piles. Flowers are refrigerant, emollient, demulcent, aphrodisiac and emmenagogue. Fresh flowers are mecerated and mixed with water is taken to cure scanty menstruation. Leaves are emollient, anodyne and aperient. Roots are valuable in cough.

Chemical constituents

Leaves and stems contain β-sitosterol, stigmasterol, taraxeryl acetate and three cyclopropane compounds and their derivatives. Flowers contain cyanidindiglucoside, flavonoids and vitamins, thiamine, riboflavin, niacin and ascorbic acid.Quercetin-3-diglucoside, 3,7-diglucoside, cyanidin-3,5- diglucoside and cyanidin-3-sophoroside-5-glucoside have been isolated from deep yellow flowers; all above compounds and kaempferol-3-xylosylglucoside have been isolated from ivory white flower.

Pharmacological activities

Antidiabetic, Hypolipidemic, Cytotoxic, Antimicrobial, Antiparasitic, Dermatological, Antioxidant, Antiinflammatory, antipyretic and analgesic, Immunomodulatory, Cardiovascular. **[1-46]**.

Conclusion

This review presents scientific investigations thatjustify (i) the use of plant extracts of 3Malvaceaemembers (*A. indicum, H. rosasnesis and G.herbacem*) by Indian tribal populations; and (ii) theiruse as ingredients in Indian traditional medicines. All these three ethnomedicinal plants have some common classes of phytoconstituents (alkaloids, phenolics, flavonoids and steroids) to which many of the ethnopharmacological activities can beattributed. The age of the plant and the plant part used for extraction are important parameters, which can affect the ethnopharmacological activity of the extract. It is also observed that many ethnopharmacological activities (anti-inflammatory, analgesic, cytotoxic, etc.) are common to all three plants . Since all three plants belong tosame taxonomical family (Malvaceae) and also show several common ethnopharmacological activities, identification of the active principle in one plant (e.g., eugenol identified in *A. indicum* has an analgesic effect) can help in assessing the presence of that compound in the rest of the plants. Some of thephytoconstituents are common between two or more of the three Malvaceae members, but their reported ethnopharmacological effects are different. This suggeststhat the phytochemicals in separate sets of conditions can exhibit different pharmacological activitieswhich may be due to complex interaction of the phytochemicals in the cells/body of the organisms.

Therefore, further studies may be undertaken to understand the exact mechanism of action ofdifferent phytoconstituents showing various pharmacological activities, by taking cue from existingscientific investigations.

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